

ATT6_IG1_Measures_1of1

Monitoring, Assessment, and Performance Measures

The following describes the monitoring plans, assessments, and performance measures for each of the seven projects contained in this proposal.

Project 1: Soledad Water Recycling/Reclamation Project

Implementing Agency: City of Soledad

The performance measure for the Soledad Water Recycling/Reclamation Project will be the reduction in potable water use from customers switching to recycled water for their lawn irrigation needs. The City of Soledad anticipates that initially 70 acre-ft per year of potable water will be replaced with recycled water. This is anticipated to grow to 180 acre-ft per year as more customers switch to recycled water for their lawn irrigation needs.

All users receiving recycled water will be metered. Thus, the quantity of recycled water delivered monthly and annually will be recorded and used to measure performance and progress toward the goal. Correspondingly, groundwater pumpage is also recorded and those values will be compared with current and recent pumpage data to demonstrate a reduction as a result of this project. The data will be normalized for annual weather variations as well as changes in the number and type of customers on the system.

Use of actual water metering data will produce precise measures of the success of this project. This project does not contain a monitoring component other than the ongoing effluent quality monitoring at the Wastewater Reclamation Plant. Such monitoring is already being performed.

Project 2: Castroville CSD Well 2B Treatment Project

Implementing Agency: Castroville Community Services District

The primary goal of the project is to complete the construction of Well 2B, allowing the production of drinking water from the 900-Foot Aquifer to meet the drinking water requirements of Title 22 of the California Code of Regulations (CCR). This production will offset some District pumping of water from the 400-Foot Aquifer.

The desired specific outcome for the project is a municipal production well and treatment system that produces 800 gallons per minute (gpm) of potable water supply. A desired secondary outcome is a stabilization of Chloride and Total Dissolved Solids (TDS) levels at the District's wells in the 400-Foot Aquifer.

System performance will be measured and reported using two output indicators and two outcome indicators, as discussed below and summarized in Table 1 below.

Output Indicator 1: Well Production.

- Target: The target water production rate for Well 2B is 800 gallons per minute (gpm). This is based on analysis of the 900-Foot Aquifer and the well development test pumping performed during well construction, as summarized in the memorandum report *Summary of Operations, Construction of Castroville Water District Well No. 2B*. This rate will allow the well to meet 25 to 50 percent of the District's annual demand. Nominal production target is 220 acre-feet per year (25%).
- Measurement methods: A totalizing flow meter will be installed with the well pump.
- Measurement location: Well 2B.
- Reporting: Well meters are read monthly. The District General Manager makes a monthly report to the board of directors on well production and water usage. Well production is reported annually to the California Department of Public Health (CDPH), and annually to the Monterey County Water Resource Agency (MCWRA). MCWRA publishes an annual report summarizing all reported groundwater use within the Salinas Valley Groundwater Basin.

Output Indicator 2: Residual Arsenic Level.

- Target: The primary drinking water standard for arsenic is 0.010 mg/L (CCR, Title 22, §64431).
- Measurement methods: Water samples will be collected by trained water system operators and tested at an ELAP certified laboratory using EPA method 200.8. Initial start-up and testing will require frequent sampling, but routine sampling will be on a monthly basis.
- Measurement location: A sampling tap will be located after the well 2B treatment train but before the piping joins the District water distribution network.
- Reporting: Monthly water quality testing results are reported to CDPH. Results are compiled annually into a Consumer Confidence Report.

Outcome Indicator 1: Chloride Level in the 400-Foot Aquifer.

- Target: The secondary drinking water standard for chloride is ≤ 500 mg/L (CCR, Title 22, §64449). The state goal for drinking water is chloride ≤ 250 mg/L.
- Measurement methods: Water samples will be collected by trained water system operators and tested at an ELAP certified laboratory using EPA method 300.0. Routine sampling is conducted on a monthly basis.

- Measurement location: Sampling will be from Well 2A, which is on the same site as Well 2B but constructed in the 400-Foot Aquifer. An existing sampling tap is located on the well piping.
- Reporting: Monthly water quality testing results are reported to CDPH. Results are compiled annually into a Consumer Confidence Report. Source water quality information is shared with MCWRA, which compiles seawater intrusion maps.

Outcome Indicator 2: Total Dissolved Solids (TDS) Level in the 400-Foot Aquifer.

- Target: The secondary drinking water standard for TDS is ≤ 1000 mg/L (CCR, Title 22, §64449). The state goal for drinking water is TDS ≤ 500 mg/L.
- Measurement methods: Water samples will be collected by trained water system operators and tested at an ELAP certified laboratory using method SM 2540C. Routine sampling is conducted on a monthly basis.
- Measurement location: Sampling will be from Well 2A, which is on the same site as Well 2B but constructed in the 400-Foot Aquifer. An existing sampling tap is located on the well piping.
- Reporting: Monthly water quality testing results are reported to CDPH. Results are compiled annually into a Consumer Confidence Report. Source water quality information is shared with MCWRA, which compiles seawater intrusion maps.

Table 1: Performance Measures

Parameter	Sampled at	Method and Frequency	Goal or Target	Regulatory Standard	Reference
Well production	Well 2B	Flow meter	800 gpm 220 ac-ft/yr	N/A	N/A
Arsenic (post-process)	Well 2B	EPA 200.8 monthly	≤ 0.010 mg/L	≤ 0.010 mg/L	CCR Title 22 § 64431
Chloride (source water)	Well 2A	EPA 300.0 Monthly	≤ 250 mg/L	500 mg/L secondary	CCR Title 22 § 64449
Total dissolved solids (source water)	Well 2A	SM 2540C monthly	≤ 500 mg/L	1000 mg/L secondary	CCR Title 22 § 64449

Project 3: San Jerardo Wastewater Project: Water Quality Concerns in a Disadvantaged Farm-Worker Community in the Salinas Valley

Implementing Agency: San Jerardo Cooperative, Inc.

Monitoring and Assessments Status: The San Jerardo Co-operative currently operates the wastewater system and is responsible for compliance with the Discharge Permit Terms. Testing services are provided by a Monterey County company. Reports are submitted quarterly to the Central Coast Regional Water Quality Control Board (Regional Board) at this time. Wastewater flows into the treatment system are not currently monitored nor is the outflow into the drain field quantified. There are no monitoring wells in place to establish baseline levels of nitrate or other pollution load concentrations in the groundwater treatment system area. However, drinking water production wells at the site had to be abandoned because of levels far in excess of maximum accepted nitrates and 1,2,3-trichloropropane contaminants. The plumbing fixtures at San Jerardo have not been upgraded since initial installation in 1979. The Co-op has not installed or upgraded water-restricting faucets, showerheads or low-flow toilets in the residential units, in the child-care facility, or the community room. Water conservation and recycling education programs or materials were not provided by previous drinking water system owners and no educational programs have been implemented by Monterey County to date. No formal study of the feasibility or cost benefit of water recycling or grey water diversion has been undertaken at this juncture, however, both could have a positive impact on wastewater system efficiency and water usage. San Jerardo's Discharge Permit does not require a certified wastewater system operator. The residents provide volunteer labor to maintain the system and keep it in good working order. The Co-operative wastewater system is operated by the General Manager under the supervision of a volunteer Board of Directors of the Co-op.

Monitoring Assessment and Performance Proposed Improvements: The project includes installation of three groundwater monitoring wells up-and-down gradient from the system. The well sites will be determined by the project engineer based on the results of the hydrological study recommendations. Samplings will be taken in accordance with Central Coast Regional Board requirements. Flow meters will be installed at the treatment pond intake and outflow locations to quantify effluent generation and outflow to the drain field area. Repairs to pond embankments will prevent spills of untreated effluent when the system is at maximum capacity at times of peak occupancy and during winter storms. Water conservation improvements are expected to produce immediate measurable reductions in wastewater from households projected at 20% by the end of 2012 and an additional 10% by the end of 2013 when taking into account the summer seasonal migrant Headstart program at the child-care facility located on the Co-op. Installation of the fixtures and out-flow metering at intake to the treatment ponds early in the construction process will produce measurable results prior to project completion.

Reporting Methods: Water Quality sampling results will be reported on a quarterly basis to the Central Coast Regional Board and Monterey County in GAMA-compatible formats. Water usage will be recorded in accordance of IRWMP protocols and distributed to interested parties. Improvements to management of the wastewater system will be measured by participation and completion of training programs and State certification of volunteer residents as Wastewater Operators. Records will be available at the Rural Community Assistance Corporation (RCAC), the Co-operative office and online Water System Operator State certification listings. Quarterly project completion reports will be submitted to the State through the applicant. Records will be maintained by the Co-operative, and distributed to interested parties upon request. Construction Project invoices will be reviewed by the project engineer and fiscal agent and maintained at the Co-operative. Labor Standards records and reports will be filed in accordance with the Labor Standards Compliance Plan approved by DIR.

Please see the Project Performance Measures Table below.

Project Performance Measures Table: San Jerardo Wastewater Project

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
Reduce nitrate, tri-chloropropane and other pollutants released from wastewater system into groundwater	Significant pollutant load reduction	Measurement of nitrates, tri-chloropropane released from treatment and retention ponds to leach fields Measurements at monitoring wells to be installed with this grant.	Measurements of reduced nitrate, tri-chloropropane and other contaminants compared to pre-improvement levels	Monitoring well installation at one up gradient and two down gradient sites for the system. Monthly sampling from treatment ponds and monitoring wells with quarterly reporting to MC Environmental Health, MCWR and RWQCB in GAMA compatible formats	<ul style="list-style-type: none"> • 20% reduction in nitrates from system samples. • 10% reduction in trichloropropane in groundwater monitoring wells.
Reduce household water use to lower impact on wastewater treatment system	Significant reduction in inflow to wastewater system	Measurement of water flow at intake to wastewater system	Measured reduction of intake flow to wastewater system compared to baseline readings taken prior to installation of water conservation fixtures and resident education program	Flow measurements to be taken monthly and compared to installation percentage of completion. At full rollout, flow differentials will be recorded in accordance with IRWMP protocols and distributed to interested parties.	<ul style="list-style-type: none"> • 80% of households participate in the water conservation grant program. • 100% of residents participate in the community water conservation educational program. • 10% reduction in individual household water consumption. • 10% reduction in wastewater flows into the wastewater system
Increase resident capacity to manage wastewater system.	Increase access to wastewater treatment operator and wastewater system management educational opportunities.	Number of residents and board members that participate in classes and complete coursework.	Increased number of residents and board members take classes offered by RCAC and others.	RCAC and other educational providers will record applications and completion data semi-annually. Certification lists are available on-line. Program data will be maintained in accordance with IRWMP protocols and distributed to interested parties.	<ul style="list-style-type: none"> • Two resident members of the San Jerardo Co-op will obtain Operator I Certification. • The General Manager and two members of the Co-operative Board of Directors will complete coursework on wastewater system management.

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
Research, develop and adopt a water recycling and grey water plan for San Jerardo to include a blueprint for implementation if recommendation to proceed results.	Determine feasibility of water recycling and grey water diversion for the San Jerardo community.	Status of plan development, peer review and permitting agency review.	Final plan released and adopted by Board of Directors of the San Jerardo Co-operative.	Plan will be distributed to interested parties, filed with IRWMP in accordance with established protocols and records will be maintained at the Co-op.	<ul style="list-style-type: none"> • The draft synopsis and recommendations will be made available to all residents in Spanish and English. • A translator will be present to facilitate at two planned community meetings to discuss the draft plan. • The Co-op Board of Directors will hold two hearings prior to plan adoption.

Project 4: Integrated Ecosystem Restoration in Elkhorn Slough

Implementing Agency: Elkhorn Slough Foundation

Project performance with respect to the goal “Increase the extent and the sustainability of tidal marsh in Elkhorn Slough in the face of climate change” will be tracked in two ways, centered on the two major themes for this phase of the project: engineering analysis and regulatory compliance, as follows:

1. Completion of the 30% Design Report will enable the establishment of the sediment stockpiling areas. Once established, donor projects can secure final permits and begin to deliver sediment. The establishment of the staging areas will indicate that this milestone has been achieved. Verification that the staging area has been established will be provided by an As-Built Report. The target is to achieve this milestone on schedule.
2. Progress with respect to regulatory compliance will center on the achievement of key milestones in the CEQA process. Progress will be marked by the timely completion of the Initial Study and Project Description. The target is publication of these items on schedule. (In Phase 3 of the project, this goal will be tracked by quantifying the acreage of tidal marsh restored.)

The goal “Reduce the costs of water management in the region by integrating projects” is focused on the identification of win-win opportunities that combine sediment management and wetland restoration projects to reduce project costs. The primary indicator of success will be whether such win-win alternatives are identified. In order to quantify the benefit of integrating projects, these savings will be evaluated in the Engineer’s Cost Estimates and Cost Benefit Analysis. Part of the 30% Design Report, this analysis will compare paired projects against projects implemented individually. The target for success is to identify at least one alternative where the paired project represents a cost savings over individual projects.

Progress in achieving the goal “Protect and improve surface water quality in Elkhorn Slough” will be demonstrated by the implementation of the native grass buffer, a proven best management practice for agricultural non-point source pollution. The areal extent of the grass buffer will be the quantity measured to verify progress. The target extent of the grass buffer is 4.0 acres. (In Phase 3 of the project, this goal will be tracked by the establishment of the remaining acreage of the native grass buffer.) This project is consistent with the Basin Plan. Elkhorn Slough is impaired with respect to water quality, frequently violating Basin Plan objectives. The 2010 303(d) List Staff Report of the Central Coast Regional Water Quality Control Board lists 14 separate impairments in the watershed warranting TMDLs.

Please see the Project Performance Measures Table below.

Project Performance Measures Table: Integrated Ecosystem Restoration in Elkhorn Slough

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
Increase the extent and the sustainability of tidal marsh in Elkhorn Slough in the face of climate change	Acreage of tidal marsh is increased and the “accommodation space” for marsh building sediment is decreased	Completion of the 30% Design Report Publication of the Initial Study and Project Description	Establishment of sediment staging areas	GPS, mapping, As-Built Report Verification of online posting of documents	Staging area established on schedule Initial Study and Project Description published on schedule
Reduce the costs of water management in the region by integrating projects	The most cost-effective strategies to wetland restoration and sediment management are identified and developed	Cost estimates are developed that compare the costs of a paired project alternative with separate projects	Paired projects are identified that reduce costs for both project proponents	Engineer's Cost Estimates and Cost Benefit Analysis	Engineer Cost Estimate for a paired project alternative is less than estimate for separate projects
Protect and improve surface water quality in Elkhorn Slough	Agricultural runoff is intercepted by vegetated buffer	Publication of Native Grass Buffer Design Report	Phase 1 planting of the native grass buffer	GPS, mapping, area comparison	Minimum of four acres of native grass buffer planted

Project 5: Water Quality Enhancement of the Tembladero Slough and Coastal Access for the Community of Castroville

Implementing Agency: Central Coast Wetlands Group at Moss Landing Marine Labs

During Phase 1 (this round of funding) project performance will be measured against the Work Plan tasks, which were designed based on the Phase 1 Goals and Objectives. The project will be considered successful if the tasks are completed with the desired outcomes within the timeline set out in the Schedule. Because the tasks are so closely tied to the goals of the project, if the tasks are completed the goals will be met.

The two project goals for this phase focus on successfully collaborating with affected parties and building support for the project. The goals are to *integrate stream restoration and water quality improvement objectives into County land-use planning and redevelopment, flood control management and agricultural operations, and create a stakeholder approved enhancement plan for slough alterations that will lead to the necessary improvements to water quality*. The Technical Advisory Committee that the CCWG forms will be key in reaching the first goal. Because they will represent a diverse group of interests and knowledge, we can measure our performance in developing comprehensive plans and collaboration based on the TAC's own approval and the success of TAC products in convincing other groups of the worth of the project. The second goal will be reached through getting stakeholder agreement on implementation plans for the on-the-ground restoration in Phase 2.

The Project Performance Measures Table below outlines the goals of the project and how we can monitor our success at meeting them. Because this phase does not include any on-the-ground monitoring or implementation, there will not be any new data collected or analyzed until Phase 2. However, ten years of water quality data conducted by the Central Coast Watershed Studies Group (CCoWS) at California State University Monterey Bay and the Monterey Bay National Marine Sanctuary on several sites along the Slough will be compiled and used as a baseline for project design.

Project Performance Measures Table:

Water Quality Enhancement of the Tembladero Slough and Coastal Access for the Community of Castroville

Project Goals (Phase 1)	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
Integrate stream restoration and water quality improvement objectives into County land-use planning and redevelopment, flood control management and agricultural operations	TAC agreement on multiple objectives of project	Number of TAC members who vote to adopt project objectives	TAC positive or negative vote on project objectives	Meeting notes	90% adoption of project objectives
Integrate stream restoration and water quality improvement objectives into County land-use planning and redevelopment, flood control management and agricultural operations	Positive review of project goals and general plans of project through scoping process	TAC comment letters regarding Project Design Elements	Positive comments on each design element (water quality, flood control, food safety, habitat, public access)	Simple spreadsheet of TAC comments	90% positive review of project design elements
Create a stakeholder approved enhancement plan for slough alterations that will lead to the necessary improvements to water quality	Landowner and operator support from all potentially affected parties. Multiple Landowners agreement to initiate the purchase of easements on 20 acres of property	Letters of Intent to secure an easement	Number of accepted letters of Intent and acreage totals	Letters of Intent with parcel numbers and acreage estimates	20 acres of identified properties
Create a stakeholder approved enhancement plan for slough alterations that will lead to the necessary improvements to water quality	Community support for Tembladero Restoration and Castroville Public Access project	Letters of support from community organizations	Number of community groups that support the objectives of the project	Compilation of meeting notes, emails and letters of support from the public	5 community groups provide support for the project including school and library groups, business organizations and faith-based groups

Project 6: Watershed Approach to Water Quality Solutions

Implementing Agency: Monterey Bay National Marine Sanctuary, Central Coast Wetlands Group at Moss Landing Marine Labs, and the Resource Conservation District (RCD) of Monterey County

Water Quality Monitoring

Water quality monitoring will be conducted by the community under the supervision of the Monterey Bay Sanctuary Foundation (MBSF) staff. This monitoring is modeled after the Salinas Clean Streams monitoring program that took place on Santa Rita Creek monthly between August 2005 and January 2007 (report attached). Monitoring will be conducted at five sites along the creek bracketing different land uses and restoration sites. Parameters will include water temperature, dissolved oxygen, pH, conductivity, transparency, nitrate-N, orthophosphate-P, e. coli, and total suspended solids. Sites will be monitored monthly and sometimes more frequently depending on restoration and agriculture practice implementation. The goal of the monitoring is to determine if we can measure improvements to water quality based on best practice implementation. All methods and protocols are recommended/approved by the Surface Water Ambient Monitoring Program. A Quality Assurance Project Plan will be submitted to the Central Coast Regional Water Quality Control Board for approval prior to any monitoring (previous QAPP attached as Appendix 6-B (ATT3_IG1_WorkPlan_46of46)).

Water quality data will be stored in a database of similar format to the state CEDEN database. Results will be compared to historical data to determine both spatial and temporal trends.

Sampling Locations for Santa Rita Creek	Location ID Number	Sampling Location and Driving Instructions	Latitude	Longitude
Upstream of the 14 th hole at the Salinas Valley Country Club	SRITA-33	Heading east on San Juan Grade Road, turn left onto Augusta Drive. Turn right onto Tam O'Shanter Rd. Park and walk north (left) on the dirt Ag road. At end of road cut over onto the golf course path and cross over pedestrian bridge. Sample below the bridge.	36 45' 01.2"	(-121 37' 54.5")
Santa Rita Creek behind 19225 Bellinzona Ave	SRITA-32	Access to this site has changed because the city locked the gate. Access is now off of Paul Ave. instead of Bellinzona. Turn right onto Denner Road from San Juan Grade Road when returning from the Golf Course site. Turn right onto Paul Ave. Park near white fence at right of way. Walk north to the site.	36 43' 50.0	(-121 38' 32.7")
Santa Rita Creek at Russel Rd and Paul Street	SRITA-34	Site is at the corner of Paul Ave and Russell Road. Sample upstream of Russell Road.	36 44' 08.0"	(-121 38' 20.7")
Santa Rita Creek Park upstream of Van Buren Ave	SRITA-35	Site is at the corner of Van Buren and E. Bolivar. Access through chainlink fence on Van Buren where the road crosses the creek.	36 43' 33.4"	(-121 38' 58.6")
Santa Rita Creek at Main St and E. Bolivar	SRITA-36	Site is located where Santa Rita Creek flows under Main St just west of E. Bolivar. Sample on the downstream side of the bridge.	36 43' 28.9"	(-121 39' 22.2")

Habitat Improvement Monitoring

Habitat Improvement monitoring will be conducted by the Central Coast Wetlands Group and consist of photomonitoring and California Rapid Assessment Method (CRAM) assessments using the riverine system module. CRAM uses four attributes (Buffer and Landscape Context, Hydrology, Physical

Structure, Biotic Structure) consisting of 14 metrics and submetrics (for example buffer condition, channel stability, structural patch richness, topographic complexity, percent plant invasion) to assess the overall health of a wetland and riparian system. A CRAM assessment will be conducted at each restoration site before any implementation begins to help guide the overall restoration process, again immediately after the restoration is complete. Two additional reference sites—one urban, one agricultural—will be assessed to show that the improvements are related to the projects.

CRAM final scores can range from 25-100. We would expect Santa Rita Park to increase in score from 8-10% due to the improvements in vegetation cover, and the Ferasci Park to improve 12-15% due to both vegetation and channel improvements. Photo monitoring will be used to validate the increased scores and provide a striking before and after model to act as a template for other sites. The CRAM and photo monitoring will ensure that this project is reaching the goal for the Environment as stated in the IRWM Plan “Protect, enhance, and restore the region’s ecological resources while respecting the rights of private property owners.”

The CRAM assessments will be uploaded to the CRAM website, www.cramwetlands.org.

Agricultural Practice Implementation Monitoring

Monitoring for project impacts will be conducted using the following methods:

- 1) Irrigation Management: Comparison of pre- and post-implementation irrigation distribution uniformity through paired distribution uniformity and system audit evaluations; and estimation or measurement (depending on absence or presence of flow meter) of irrigation water application and comparison with crop demand estimation using CIMIS (California Irrigation Management Information System) data.
- 2) Nutrient Management: Recording actual reduction in applied fertilizer in terms of nutrient pounds per acre based on grower communication in response to project staff recommendations. Recommendations will be based on nutrient budgets developed using soil samples, source water samples, irrigation system, and crop nutrient demand guidelines from UC Cooperative Extension.
- 3) Hillside berry farming erosion control: We will visually assess the presence and/or absence of visual signs of erosion on field roads and in furrows and ditches and estimate the annual delivery of sediment in tons from project sites by simple surveys of ditches before and after winter rains, the reduction in cross-sectional area of which will be recognized as accumulated sediment lost from lands up slope. These estimates will be compared with natural erosion rates as well as those estimated for the site if no erosion control efforts were made using the NRCS “Practice Effectiveness for the Elkhorn Watershed” spreadsheet (2002).
- 4) Manure Management on Ranchette parcels: From physical measurements of each animal-holding area and associated drainage structures, local rainfall data, estimated potential nutrient and pathogen production per animal, and published effectiveness data of the BMPs employed on each site, we will run a “Load Reduction Model” developed specifically for small-acreage livestock holdings to generate an estimate of reduced delivery of relevant pollutants.

Please see the Project Performance Measures Table below.

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
Implementation of Erosion Control practices	No impact on Santa Rita Creek from upstream agriculture	Observation of erosion. Volume of sediment leaving strawberry fields	Visible lack of gullies and erosion on roads, furrows and slopes. Drains and ditches below fields lack excessive sedimentation	Visual assessment of rills and sedimentation. Estimation of volume of sediment in field bottom ditches based on sampled cross sections prior to and following winter storm periods.	80% less sediment in participating field bottom drains than estimated for the same fields without treatment
Implementation of Irrigation Management practices	No impact on Santa Rita Creek from upstream agriculture	Volume and timing of applied water. Observation of excessive irrigation tailwater or system leaks.	Applied water compared with estimated demand according to weather, soil, crop data, and irrigation system best practices. Presence/absence of significant leaks or other inefficiencies contributing excessive tailwater	Flow meter readings; recording of irrigation start and end times; CIMIS data incorporated into demand estimation formula; distribution uniformity evaluations; system efficiency audits; observed leaks	Irrigation efficiencies of 70% for furrow irrigation, 75% for hand-move sprinkler, 80% for solid set sprinkler, and 90% for drip irrigation sites
Implementation of Nutrient Management practices	No impact on Santa Rita Creek from upstream agriculture	Pounds of nutrient applied per acre. Load of nitrate and orthophosphate in tail water	Reduced input of fertilizer per acre. Reduced fall applications of nitrogen.	Communication with growers and recording of fertilizer applications and timing	20% reduction in pounds of nitrogen applied per acre; 50% of participating growers reducing or eliminating fall nitrogen fertilizer applications
Implementation of Manure Management practices	No impact on Santa Rita Creek from local ranchettes.	Load of nitrogen, sediment, and/or pathogens in drains leaving properties	Reduced pollutant load in water leaving participating ranchettes	Load Reduction Model for participating ranchettes run prior to and post BMP implementation	Estimated load reductions of 80% at participating ranchette sites
Improved Habitat on Santa Rita Creek	Healthy native vegetation on 0.25 miles of creek.	Increased cover of native vegetation, reduction in bare ground and non-native vegetation	Comparison of before and after photos, and pre- and post-project CRAM scores	CRAM (one assessment at each and one reference site done before and after implementation). Photo Monitoring	Improvements in some metric scores for leading to an improvement in overall CRAM score of 12-15% for the ball field and 8-10% for the park
Improved Water Quality Conditions in Santa Rita Creek	Natural flow of pollutant-free water in Santa Rita Creek.	Measurements for: - Water temperature - Dissolved oxygen - Total suspended solids - Orthophosphate - Nitrate - e. Coli	Results will be compared to historical water quality results for ambient conditions.	Methods will be SWAMP comparable and will be formatted to upload to CEDEN.	90% of water quality measurements taken in Santa Rita Creek meet the nutrient and FIB objectives for Cold Water Fish beneficial use
Community support and understanding of healthy environment	Community members support a clean, native vegetated, litter free Santa Rita Creek.	Number of Community Member participation Reduction in amount of trash.	Tracking community participation in WQ monitoring and at events. Pounds of trash collected	Comparison of participation and amount of trash collected between Y1 and Y3	

Project 7: Evaluation of Potential for Stormwater Toxicity Reduction by Low Impact Development (LID) Treatment Systems

Implementing Agency: UC Davis Granite Canyon Marine Pollution Studies Laboratory

The project does not entail new construction, and as such, does not have a post-construction monitoring component. The project entails evaluating the efficacy of four constructed urban bioswales in reducing stormwater runoff toxicity. The project in itself can be considered a monitoring project, and includes toxicity testing with three species and chemical analyses as the two main indicators of effectiveness. These components are detailed in the Work Plan narrative tasks descriptions, but are briefly summarized here.

Toxicity testing of stormwater runoff pre and post treatment will be conducted using three standardized US EPA acute toxicity test protocols for *Ceriodaphnia dubia*, *Hyalella azteca*, and *Pimephales promelas* (US EPA 2002). The toxicity endpoints will measure reduction of stormwater toxicity before and after treatment with bioswales.

Chemical concentrations and loadings of suspended solids, metals, PAHs, nutrients and pesticides will be analyzed in water samples collected before and after treatment by bioswales. GC/MS and NCI-GC/MS will be used to analyze organic pollutants. ICP/MS will be used to analyze metals. Total Suspended solids (TSS) will be analyzed using EPA Method SM 254OD. Nutrients and turbidity will be analyzed using a spectrophotometer.

This monitoring data will be important for regional stormwater management agencies to use in future land use planning decisions.

Please see the Project Performance Measures Table below.

Project Performance Measures Table:
Evaluation of Potential for Stormwater Toxicity Reduction by LID Treatment Systems

Project Goals	Desired Outcomes	Output Indicators	Outcome Indicators	Measurement Tools and Methods	Targets
Assess efficacy of LID practices (bioswales) to reduce stormwater toxicity.	Reduction of stormwater toxicity after treatment with bioswales	Survival of crustacean and fish toxicity test species before and after stormwater treatment in bioswales	Parametric statistical comparisons of toxicity test organism survival before and after stormwater treatment by bioswales	Standardized US EPA acute toxicity test protocols for <i>C. dubia</i> , <i>H. azteca</i> , and <i>P. promelas</i> (US EPA 2002)	N/A. Project will not entail new construction. Monitoring is a main component of this project, as described in the Work Plan, with no targets other than accurately capturing treatment efficacy.
Determination of stormwater pollutant load reduction through bioswales	Reductions of contaminant loadings through treatment of stormwater with bioswales	Chemical concentrations and loadings of suspended solids, metals, PAHs, nutrients and pesticides before and after bioswale treatment	Watershed modeling, rainfall totals, stormwater flow, storm hydrograph characterization, contaminant analysis, contaminant loading, contaminant load differences before and after bioswale treatment	GC/MS and or NCI-GC/MS – organic pollutants (PAHs, pesticides, EPA Method 8310 or 625M Negative Chemical Ionization); ICP/MS – metals US EPA 200.7, TSS - EPA Method SM 2540D), nutrients - spectrophotometric, turbidity - spectrophotometric	N/A. Project will not entail new construction. Monitoring is a main component of this project, as described in the Work Plan, with no targets other than accurately capturing treatment efficacy.
Provide data to stormwater agencies, water quality managers, LID engineers, and others to be incorporated into future land-use planning and management decisions.	Final report discussing the effectiveness of bioswales constructed for residential and commercial applications	N/A	N/A	N/A	Final Report will be distributed to at least five different stormwater agencies and regional water quality managers.